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Distribution, investment, and employment in South Africa

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Abstract

   This paper examines how distributive outcomes and unresolved distributive conflicts affect the rate of productive investment and what the implications are for the level of joblessness people face in South Africa. The link between investment and employment is developed within a context of "Keynesian" and "classical" unemployment. Using time-series and cross-sectional data, estimates of the relative importance of different determinants of the rate of investment in South Africa show strong robust effects from profit rates, economic growth, and the degree of social and political conflict. The results support the argument that both distributive outcomes and distributive conflicts are important influences on the rate of investment. A short discussion of policy implications concludes the paper.

I.   Introduction

   What factors are important in determining the rate of investment in South Africa and what strategies are appropriate for job creation? This paper provides some answers to this important question. In particular, the research results shed some light on a general set of questions: how do unresolved distributive conflicts affect the level of productive investment and what are the implications for the level of joblessness people face? The economic puzzles of what determines the rate of capital accumulation and the aggregate demand for labour have been perennial questions throughout the history of economic policy-making, yet the emergence of "jobless growth" in South Africa within a context of a highly unequal distribution of income provides a compelling reason to re-examine the relationships between inequality, investment, and employment. The research relates to a broader project of investigating how conflict over the distribution of economic resources, when not resolved effectively, can erode the effectiveness of economic institutions in producing greater participation in the activities and benefits of an economy – for example, through greater employment and more equitable distributions of income.

   The importance of finding answers to these questions clearly comes from the need to address the problem of persistently high levels of unemployment in South Africa. Apart from the direct effects more jobs will have on the standard of living in South Africa, less unemployment will likely have general social benefits, such as lower crime

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1   Michael Ash, Samuel Bowles, Andrew Glyn, Tom Hertz, Robert Pollin, and Elisabeth Wood provided me with useful suggestions, guidance, and discussions.

rates, stronger families and communities, and a larger economic base to fund social reforms. To address the problem of unemployment, the productive capacity of the economy must expand; that is, the rate of investment must increase. Investment is a critical link between higher rates of growth and more employment opportunities. Understanding the determinants of productive investment, therefore, is a necessary component to developing effective policies to address the on-going problem of joblessness.

The paper is organized as follows. I begin with a discussion of two categories of unemployment – Keynesian and classical – in order to set the stage for an investigation of the relationship between investment and employment. Then I turn to the question of the roles that distributive outcomes and social conflict play as determinants of investment. The forth section presents empirical evidence of the relative importance of different factors in influencing patterns of investment in South Africa. A discussion of possible policy implications follows. Finally, the concluding section summarizes the main points of the paper and points to areas for further research. The appendix to this paper contains a detailed technical discussion of the economic models used and the methods employed for generating the statistical results.

II. Keynesian v. classical unemployment

Involuntary unemployment occurs when workers are rationed in the labour market: demand for labour falls short of its supply. In discussions about the causes of unemployment, Edmond Malinvaud has developed two broad classifications for the lack of sufficient labour demand (Malinvaud 1977).[2] The first he labels "Keynesian unemployment," in which a lack of sufficient aggregate demand in the product market leads to lower levels of capacity utilization by firms and less demand for labour. Therefore, when sellers are rationed in the goods market (that is, they cannot sell everything that they could produce), rationing of jobs in the labour market occurs. Using this definition, the "Keynesian" demand for labour is expressed as total demand for goods and services divided by the average labour productivity in the economy (Malinvaud 1980). When the "Keynesian" situation prevails, increasing aggregate demand for goods and services reduces the level of involuntary unemployment.

Even in economies with significant aggregate demand and high levels of capacity utilization, however, unemployment often persists. Furthermore, the overall number of jobs can decline despite reasonable rates of growth in aggregate consumption and investment - the phenomenon of "jobless growth". Malinvaud offers a second framework in order to help analyse these situations – "classical unemployment." With classical unemployment, a prior insufficient rate of accumulation of labour-absorbing fixed capital creates a situation in which, at full capacity utilization, demand for labour falls short of

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2 The distinction between Keynesian and classical unemployment is not only a creation of Malinvaud. Writes such as Joan Robinson identified the distinction in prior years (Robinson 1980). Nevertheless, Malinvaud develop the ideas more systematically within the context of increasing structural unemployment in Europe.

supply.[3] Aggregate demand in the product market is greater than or equal to potential output. In order to overcome classical unemployment, the rate of investment must increase in order to absorb surplus labour.

"Pure Keynesian" or "pure classical" unemployment might not be the most useful categories for describing rationing in the labour market. A richer approach would allow for both classical and Keynesian unemployment (d'Autume 1990). Also, the distinction between the two is not always as clear as it might seem at first. A fall in investment, both a component of aggregate demand and a determinant of productive capacity, could contribute to both classical and Keynesian unemployment. Therefore, I propose to develop a framework can be developed that expresses a mixture of the two types and then use this framework to link labour demand to capital accumulation. Suppose that the demand for labour were expressed using the following accounting identity:

$$L_t^D \equiv \mu_t \, K_t \, \lambda_t$$

in which L_t^D is labour demand in time 't,' μ_t is the level of capacity utilization ($0 \leq \mu_t \leq 1$), K_t is the stock of fixed capital, and λ_t is the labour-capital ratio. The maximum potential labour demand at full-capacity utilization ($\mu_t = 1$) therefore depends on the level of capital stock and the relative capital-intensity of the production process. At full capacity utilization, if workers are rationed in the labour market, involuntary unemployment is purely classical. On the other hand, if total labour supply is less than or equal to $K_t \lambda_t$, if $\mu_t < 1$, and if workers are rationed in the labour market, involuntary unemployment is purely Keynesian. In all other circumstances, unemployment is a mixture of the two types. The above expression allows us sufficient flexibility to explore the persistence of unemployment in South Africa and the recent trend of "jobless growth".

In high-income countries, whether rates of investment influence rates of unemployment in the very long-run remains an unsettled question.[4] However, empirical studies have shown a relationship between investment and employment in OECD countries (Rowthorn 1995). Others have pointed out that excluding capital stock from labor demand estimations can lead to errors of misspecification (Nickell and Symons 1990). Furthermore, the degree to which additional investment affects employment is sensitive to the assumptions made about technology and the substitutability of capital for labour, among other factors (Rowthorn 1999).

The extremely high level of joblessness in South Africa is widely believed to be a structural problem that cannot be explained simply as a lack of sufficient aggregate demand. While cyclical fluctuations in capacity utilization do play a role in determining the level of employment, these factors can only explain a portion of the unemployment problem (Chadha 1995). South African unemployment, therefore, has classical attributes

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3 Malinvaud stress the lack of sufficient accumulation of productive capital in his definition of classical unemployment. The distinction of "labour-absorbing" capital investment is my own.
4 The insensitivity of long-run unemployment rate to capital accumulation is linked to the argument that, over the long-run, the observed unemployment do not seem to follow a well-defined trend (Layard, Nickell, and Jackman 1991). However, this perspective is debatable (see, for example, Galbraith 1997)

in which insufficient rates of capital accumulation contributed to the widespread lack of job opportunities. Figure 1 shows the rate of accumulation of non-residential fixed capital (that is, the rate of investment in productive capacity) for seven industrial sectors (mining; manufacturing; electricity, gas, and water; construction; wholesale and retail trade; transportation and communication; and finance) from 1965 to 1995.5 A dramatic drop-off in the rate of investment is evident in the mid-1970s. From the figure one can see how low levels of capital accumulation over many years set the stage for the current unemployment crisis.

Figure 1 about here

Addressing the problem of unemployment in South Africa therefore depends, in part, on improving rates of investment. However, significant gaps in understanding the process of fixed capital investment remain despite a vast literature on the subject. Investment models derived from the neoclassical theory of optimal capital accumulation placed primary emphasis on the price of investment goods, the cost of capital, and the corporate tax structure (for example, Jorgenson 1963). Empirical estimates of investment functions often show more robust effects from non-price variables, for example capacity utilization, than from relative prices, such as interest rates (Hassett and Hubbard 1996, Chirinko 1993, Clark 1979). Tobin's Q[6] provides a compelling theoretical framework for explaining investment (Tobin 1969), yet empirical studies of the impact of marginal changes in the ratio of equity values to replacement costs have been uneven – many perform quite poorly. While estimates of marginal Q are often correlated with investment, a large portion of investment behaviour remains unexplained (Abel and Blanchard 1986). Other studies underscore the role distributive outcomes play as determinants of the rate of investment, and many provide empirical evidence supporting a positive relationship between the profit rate and level of investment (Gordon, Bowles, and Weisskopf 1998, Glyn 1997, Marglin and Bhaduri 1990, Kalecki 1965).

This paper will draw on this substantial literature in develop its estimates of the determinants of investment in South Africa. In particular, the analysis will emphasize the impact distributive outcomes can have on investment. It is to these issues of distribution that I now turn.

III.   Distribution, competing claims and investment

Distributive outcomes can play an important role in determining the rate of investment. Investors care, among other things, about the rate of return on their investment. Since competing claims on economic output – for example, taxes for social

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5   For a more complete overview of various patterns in South Africa's fixed capital stock and investment timer series, see Prinsloo and Smith (1996).

6   Tobin's Q is the ratio of market values to replacement costs of a company's assets. When Q is greater than one, the market value is greater than replacement cost, and it pays to invest more because expected returns exceed costs. When Q is less than one, it does not make sense to invest. Marginal Q refers to the change in the ratio of market value to replacement costs associated with a given change in investment.

service delivery or higher real wages to improve standards of living – can reduce the realized rate of return, finding effective solutions to these distributive problems is an important component to an investment strategy and, by extension, a strategy for job creation. For South Africa, the legacy of apartheid means that questions of competing claims on economic resources will likely be profound. The need is to negotiate an effective path that encourages job-creating investment and simultaneously addresses the social backlog of the apartheid years. In addition, by looking at investment and job creation in this light, policy options will stress the different ways of coordinating both macroeconomic strategies and labour market institutions to find effective distributive solutions.

The impact of inequality on investment and growth has received growing attention in recent years. Numerous studies have suggested a negative empirical relationship between initial levels of inequality and subsequent economic growth (Alensia and Rodrik 1994, Perotti 1994, Persson and Tabellini 1994). One mechanism through which inequality could negatively impact growth is by fostering political instability that arises from distributive conflicts (Alesina and Perotti 1996). In empirical studies, higher levels of political instability appear to reduce investment and depress growth (Alesina *et al.* 1996). This effect could operate, in part, by compromising key institutions such as property rights (Svensson 1998). However, most of the studies that investigate the impact of inequality and political conflict on growth and investment rely on large cross-sectional samples that often fail to control for unobserved country-specific effects. Controlling for these effects calls into question many of the significant relationships (Benhabib and Spiegel 1997). Other more recent studies have also suggested that the observed relationship between inequality and growth may be more complicated, pointing out important non-linearities in the data and differences between wealthy and poorer countries (Banerjee and Duflo 2000, Barro 1999).

The hypothesized negative relationship between inequality and growth has generally been explained in three ways: (1) by imperfect capital markets, (2) by growing pressures for fiscal redistribution and higher taxes when inequalities widen, and (3) economic instability arising from the distributive conflicts themselves. With imperfect capital markets, an unequal distribution of resources means that people under-invest in human capital (and, in some models, physical capital) relative to the optimal level of investment that would occur if individuals in financial deficit positions could borrow on perfect markets from individuals with financial surpluses (Galor and Zeira 1993, Bénabou 1996). In the second approach, democratic institutions, within a setting of unequal income distribution, allow for the formation of demands for fiscal redistribution financed through investment-discouraging taxation (Alensia and Rodrik 1994, Persson and Tabellini 1994, Bénabou 1996). Finally, as mentioned above, other researchers have pointed out that entrenched inequalities can produce political instability that leads to a heightened degree of insecurity about distributive outcomes and property rights, lowering the rate of investment.

One area of emphasis in this paper is on the third channel through which inequality can discourage investment – through social conflict. As mentioned above,

entrenched inequalities can produce political instability that leads to a heightened degree of uncertainty about future prospects and more insecurity over property rights. Such influences would reduce the rate of investment. Note that the effects of changes in the level of social conflict and changes in actual distributive outcomes need not be identical. Distributive conflict could produce expectations on the part of the investor that would lower the rate of investment even if current after-tax profit rates do not change. Furthermore, if social instability arises from unresolved distributive conflicts within a context of a highly unequal distribution of economic resources, investors could be concerned about maintaining their positions as residual claimants (after wage, benefit, and debt servicing payments) of the income streams generated by economic activity. Expectations of institutional changes that could threaten these economic roles, therefore, would contribute to lowering investment.

This paper places particular emphasis on the role of distributive outcomes (such as after-tax profits) and uncertainty arising from distributive conflicts (independent of the actual outcomes). In this way, the paper asks important questions, often absent in research on investment, and will shift the focus to the impact of distribution and the means by which competing claims on economic resources are resolved.

IV.   The evidence

Formal methods of economic research using South African statistical sources help shed light on the relative importance of the different factors that influence investment. This section presents the key research finding. The data used in these estimates was drawn from three main sources: (1) the Reserve Bank of South Africa; (2) Statistics South Africa (formerly the Central Statistical Service); and (3) the Institute of Race Relations. I compiled data for seven industrial sectors of the South African economy: mining; manufacturing; electricity, gas, and water; construction; wholesale and retail trade; transportation and communications; and finance. The data set covered the years 1970-1993.[7] This data was then used to estimate the impact of changes in four key variables – the after-tax rate of profit, the cost of capital, the rate of growth in value added (a measurement of sectoral growth), and an indicator of political unrest and social conflict – on the rate of investment. Note that the appendix to this paper contains a much more detailed technical description of the variables used, the economic framework for the analysis, and the econometric methods employed. Interest readers are encouraged to look there for a much richer discussion of the formal study.

What factors have the largest influence on the rate of fixed capital accumulation in South Africa? The estimations of the statistical analysis (see Table C.3 in the appendix) provide some insight. In order to interpret these results, however, the estimated

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7 The data could be extended beyond 1993 for most of the key variables. However, the measurement of political unrest and social conflict would need to be changed to reflect new realities in the post-apartheid era. Because this would introduce a structural break in the analysis, the years are limited to 1970 to 1993. No critical information appears to be lost because the relationships remain robust when the time series is extended beyond 1993.

effects of the different variables should be standardized in order to compare the relative impacts of the different determinants of investment. In addition, to gauge the effect of the different factors on the rate of net investment, the magnitude of the changes of the different variables over the period examined (1970-1993) must be taken into account.

Table 1 summarizes the results and presents calculations that allow more careful comparisons. The table reports standardized coefficients[8] for equation (4) from Table C.3 (see appendix). The standardized coefficients give us a common yardstick in order to measure the relative influence of changes in the different factors on the rate of investment. Without standardizing the results, the measured effects become sensitive to the units the variables are measured in (smaller units of measure would correspond to larger estimates, even if the underlying relationships were identical). In addition, the coefficients for equation (4) were converted to their long-run counterparts.

While Table 1 only shows results for one set of estimated relationships, the results were extremely robust across different estimations. See the appendix for a more complete table of results. The results, shown in Table 1, account for the adjustment dynamics of the rate of investment over many years. Therefore, these estimates seem most appropriate for addressing the central question of this paper: what factors influence the rate of investment over time?

From Table 1, it is clear that the largest standardized coefficients belong to the after-tax profit rate. The index of political rest, reflecting social and distributive conflict, has the second largest standardized coefficient. Economic growth, as measured by the real change in value added for each sector, demonstrated a strong positive influence on investment. However, the user cost of capital (which includes interest rates, among other factors) did not show a strong influence over rates of investment. While the estimated effect of higher capital costs is a reduction in the rate of investment, as would be expected, the results are not statistically significant.

Table 1 about here

Table 1 also reports the estimated contribution of each explanatory variable, *ceteris parabus*, across two different business cycles, one at the beginning of the period, 1970-75, and one at the end, 1985-92.[9] When the actual changes in the variables are used to estimate the impact on the rate of accumulation, the largest effect can be attributed to growing social conflict – estimated to be approximately twice the effect of any of the other variables, taken independently. Significant increases in political unrest and distributive conflict, as were evident during the years of mass mobilization against apartheid, appear to have a large impact on the rate of accumulation, independent of the

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8 Standardized coefficients reflect the change in the rate of investment associated with a one standard deviation change in the exogenous variable.

9 To determine the overall impact of changes in the determinants of investment on the rate of fixed capital accumulation, I calculated the average values of the explanatory variables across the two different business cycles. Using these changes in business cycle averages and the estimated coefficients, I computed the impact of the changes in these variables on the rate of capital accumulation.

actual distributive outcomes (for example, declining profitability). In these estimates, the smallest effect comes from rising capital costs (even if the estimated coefficients are taken to be significant), a finding consistent with many other empirical studies of investment.[10]

The statistical results present strong evidence that distributive outcomes (the profit rate) and social conflict (that could arise from competing claims on scarce resources) have a strong influence on investment in South Africa. Both actual distributive outcomes and the way that competing claims on economic resources are resolved will exert an influence over the speed with which the productive capacity of the South African economy grows.

V. Discussion

Creating policies to boost investment and create jobs is like walking a razor's edge: improving profitability by containing labour costs or lowering taxes provides investors with incentives, but could worsen social conflict if inequalities expand. Addressing inequalities, on the other hand, could compromise profitability and reduce the rate of investment. Are there ways of increasing productive capacity and employment without increasing inequalities? In other words, are there redistributive strategies that are consistent with growth and job creation? An affirmative answer to that question must take into consideration the issues raised in this study: both distributive outcomes and distributive conflicts affect investment in South Africa.

One immediate question is: how relevant are the estimated results to the current situation in South Africa? For example, the measurement of political unrest focuses on relevant indicators during the years of mobilization against apartheid. This measurement hardly seems relevant in the year 2000. However, there are other indicators of social and distributive conflict that are relevant: industrial disputes, shop floor conflicts, the crime rate, and the incidence of violent acts. While the nature of social conflict has changed, it seems premature to dismiss social and distributive conflict as an important influence on the rate of investment in South Africa. Certainly, more research is needed, but the results in this paper contain important lessons.

Before moving on to more concrete issues, a word must be said about economic growth. Economic growth holds the potential to raise incomes at the bottom if some of the benefits of growth are distributed to the most disadvantaged. Therefore, one argument would be to create conditions for relatively high levels of predictable profitability; the growth that results from increased investment would, in the long-run, lift the incomes of the poorest segments of society. However, it is possible for economic growth to improve

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10 Other measurements of the user cost of capital were used in identical regressions without any improvement in results. In particular, a version of the cost of capital measure suggested by David Fielding (1999) to estimate the determinants of South African manufacturing investment was calculated for the panel data set, but it did not yield significant results. This measure includes the price of capital goods, the nominal interest rate, the rate of depreciation, and capital gains, deflated by producer prices.

the absolute level of income of the poorest while increasing the overall level of inequality in an economy. In order for this to happen, the higher income segments of the population must receive the lion's hare of the benefits of economic growth. Therefore, growth alone is not enough to address inequality. Inequality can carry with it significant social costs – for example, the negative impact of distributive conflict on investment. Other costs of inequality might include higher crime rates, less social connectedness, and pressures on low-income families trying to accommodate median consumption expectations. The focus of this section will therefore be on redistribution and investment together, not simply on economic growth.

I will suggest four areas of engagement for thinking about redistributive strategies that are consistent with sustaining relatively high levels of investment. These include: asset-based redistribution, creating the space for more expansionary macroeconomic policies, targeted industrial policies, and shared productivity enhancement. These suggested areas are not exhaustive, nor will the discussion be highly detailed. They are simply raised as possible components of a strategy to simultaneously address inequality, investment, and joblessness.

Asset-based redistribution. The idea behind asset-based redistribution is to broaden the base of ownership in the South African economy. This could lessen distributive conflict while decreasing inequalities without necessarily disrupting the process of investment. If investors respond negatively to redistributive policies because it threatens their role as residual claimants (that is, people who have a claim on the value of economic production after wages, benefits, and interest payments), then a redistributive strategy that expands the number of residual claimants could lessen the threat. A combination of worker ownership, co-operative business enterprises, employee share ownership programmes, and the redistribution of natural assets (such as land) could comprise an alternative strategy. Collective bargaining or other negotiating processes, supported by government incentives, could provide the means through which asset redistribution could be made a reality. In some cases, asset-based redistribution has the potential of threatening property and contractual expectations and could lead to a disruption of investment and economic activity (for example, land seizures in Zimbabwe). Therefore, a focus on newly-created assets (for example, assets that expand current productive capacity) provides one possible solution. In the case of land and other natural assets, the ability to create new assets is limited. Therefore, a well-designed reform programme for redistribution that protects the rights and maintains the responsibilities associated with ownership would be critical.

Expansionary macroeconomic policies. An expanding economy attracts and encourages investment while generating resources that can be used to meet basic needs. Furthermore, economic growth can reduce conflict over the distribution of income, as business, labor, and government would likely enjoy some increase in the absolute size of their shares. Therefore, in the face of high levels of unemployment, an expansionary macroeconomic strategy is an important alternative to consider. However, greater global integration and increased mobility of financial resources has placed constraints on macroeconomic flexibility. Lowering interest rates could cause portfolio investment to flee, prompting a devaluation of the rand. While the estimates in this paper did not show a strong direct

impact of lower interest rates on investment, they did show a positive reaction to economic growth in general, and such growth can be fostered by lower rates. However, a plunging value of the rand could counteract the positive influence of lower interest rates by increasing macroeconomic instability. Capital controls, if effectively designed, can protect domestic policy from the rapid inflows and outflows of "hot money" and create the space for modestly more expansionary policies. Existing exchange controls would have to be modified or replaced in order to target short-term capital flows more directly.

In addition, the question of controlling inflation remains a potential obstacle for macroeconomic policy, although the extent to which inflation must be reduced is debatable. A high productivity environment with more competition can contain prices while improving standards of living – unlike efforts to raise interest rates. A stronger on these aspects of a development strategy could free some room to pursue less restrictive macroeconomic policies.

Targeted industrial policies and public infrastructure projects. The empirical estimates contained in this paper show that investors respond to changes in the rates of return of their investments, as would be expected. Therefore, investment could be encouraged by raising the rates of return through discretionary tax policies and targeted incentives. In addition, public infrastructure projects could create jobs while securing conditions for greater profitability (fro example, improved transport and communications infrastructure). These industrial interventions imply that winners and losers must be selected. Many economists would argue that such interventions are distortionary – they alter market signals in such a way as to promote "over-investment" in some industries and "under-investment" in others.. However, encouraging investment in a particular area or industrial sector is not distortionary if social welfare increases as a result. But how do you pick a winner? To improve social outcomes through targeted industrial intervention such policies should be designed to encourage investments with a high social return – including the social returns attached to job creation. There is good reason to believe that employment creation has total social returns that exceed private benefits. As previously mentioned, these social benefits include more stable social relations, stronger families and communities, less crime, and a broadening of the tax base to fund fiscal expenditures to meet basic needs. Tax concessions will reduce public revenues from businesses for fiscal redistributive programmes, but if the concessions increase investments with high social benefits, the final result could be a net improvement in social well-being.

Shared productivity enhancement. Productivity improvements can generate economic resources for investment. They can also raise returns without compromising real wages. In fact, higher productivity supports more investment and higher average standards of living. Productivity improvements – that is, producing more output from a given amount of labour and capital – are multifaceted. They do not simply reflect technological progress. In many cases, productivity improvements are more a matter of solving problems of conflict and social coordination. In particular, if employees fail to share in productivity gains, the results can be reduced trust, a compromised sense of "fairness," and workplace conflict. Effective sharing of productivity gains through increases in living standards can lessen distributive conflict and simultaneously increase investment. Furthermore, productivity improvements can be directly linked to asset-based

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redistribution. When labour has a stake as a residual claimant, the incentives to improve productivity have the potential to become more pronounced.

VI.   Conclusions

This paper has shown that social unrest and distributive conflict has played a significant role in determining the rate of fixed capital accumulation in South Africa. Interestingly, social conflict has an effect independent from the actual distributive outcomes (that is, changes in the profit rate). Of all the determinants of investment explored in this paper – accelerator effects, after-tax profit rates, political unrest/social conflict, and the user cost of capital – the factors with the largest influence on investment are the rate of after-tax profit and changes in the level of social conflict. No significant relationship between the user cost of capital and the rate of investment was uncovered.

In developing effective investment and job creation policies, factors other than "economic fundamentals" need to be taken into account. The key determinants of investment can extend beyond the set of core economic influences. In many respects, solving the problem of inadequate capital accumulation can be a political problem as well as an economic one. Furthermore, new redistributive strategies – for example, asset-based redistributions – could resolve the potential contradictions between encouraging investment and pursuing a more equal distribution of income.

This paper provides evidence that political unrest and distributive conflict does impact investment, although to make this claim more broadly requires additional empirical work. The results presented in this paper, although specific to South Africa, support the theoretical argument that unequal distributions of income and assets could contribute to social conflict that then depresses the rate of investment a country experiences.

There are numerous areas for further research. I will mention five possibilities here. First, comparative studies of the impact of social and distributive conflict on investment in other countries would provide information that could improve the design of strategies to reduce inequalities. Second, this paper largely ignored the role that financial institutions play in the process of fixed capital investment in South Africa. A better understanding of financial relationships could yield a richer set of policy alternatives. Third, a better understanding the relationship between investment and jobs is critical. For example, are higher rates of investment sufficient for job creation or do additional policies have to be in place to avoid trends such as "jobless growth"? Forth, the relationship between inequality and social conflict – at the workplace, in policy debates, between stakeholders, in communities, and among families – needs much greater attention. Very little is known about the current costs of inequality in South Africa. Finally, more research into the link between investment and current social instability (for example, high crime rates) would up-date the findings in this paper.

Appendix

A. Constructing a time-series index of political instability

In order to test the hypothesis that political conflict negatively impacts investment, an index of political unrest was created using data from the Survey of Race Relations and Statistics South Africa. The technique of principal components was applied to reduce the dimensionality of a matrix of indicators of political unrest and distributive conflict, following the technique used by Alesina and Perotti (1996). The data was chosen to reflect the character of social conflict in South Africa during the last two decades of the apartheid era. The index aims to incorporate the impact of the increase in anti-apartheid mobilization in the townships beginning in the mid-1970s and the dramatic growth of industrial disputes, starting in 1973[11] and expanding with the legalization of black trade unions in 1979. Therefore, this political measurement should not only capture the impact of unrest in the segregated residential areas, but also the distributive conflicts tied to the workplace and industrial relations. The indicators selected include the average annual prison population of South Africa, the estimated number of persons held in detention without trial under the apartheid security laws[12], and the number of recorded strikes.

Similar indices of political instability have been developed for South Africa – for example, the insightful index of Fedderke *et al*. (1998). Their index contains indicators of township unrest (for example, number of people held in detention) and measurements of state control (for example, number of books censored). However, the index does not include strike activity – an important indicator of social and distributive conflict in South Africa during this period. Therefore, I chose to develop an alternative index that includes a strike component.

I constructed a time series of these indicators for the period 1970 to 1992. For two years, standard corrections for missing data had to be applied to the detentions variable. In order to use the technique of principal components, all variables were standardized - i.e. $z_{it} = (y_{it} - \mu_i)/s_i$, where μ_i and s_i are the sample mean and standard deviation for variable i, respectively. Principal components were then calculated for the matrix of standardized variables. Since the first principal component (PC) reflects the "best" summary of the trends in the variables by minimizing their squared deviations from the first PC, it was taken as the index of political unrest. Figure A.1 shows the trends in the index of political unrest (the first principal component) and the standardized variables used to construct the index from 1970 to 1992. From Figure A.1, the index of political unrest appears to capture, albeit imperfectly, some important turning points in the

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11   1973 was the year of the dockworker's strike in Durban, often pointed to as marking a break with the years of labour repression in the 1950s and 1960s.

12   Numerous pieces of legislation allowed the apartheid state to counter political unrest and resistance by detaining individuals without trial (and often subjecting them to physical violence). These laws included the Suppression of Communism Act (1950), the Riotous Assemblies Act (1956), the Internal Security Act (1976), and the provisions of the state of emergency (beginning in 1985).

resistance to the apartheid regime. For example, the Soweto uprising of 1976; the build-up to the formation of the United Democratic Front (UDF) in 1983; and the state of emergency declared from 1985-88 are all associated with local peaks in the index (although the behaviour of any single component does not necessarily capture these same patterns). Likewise, the beginnings of the de Klerk administration in 1989 and the negotiated transition to democracy are associated with a decline in the index value.

Figure A.1 about here.

Before moving to the estimates of the impact of political unrest on fixed capital investment, it would be useful to know whether there is any reason to believe that this index of political unrest generally affects economic expectations and behavior. To gauge whether the index is a reasonable indicator, I estimated a series of regression models to gauge the impact of the index of political unrest (POL) on the difference in yields between long-term government securities and three-month treasury bills. One would expect that greater investor uncertainty about the future due to growing political instability should be reflected in a reduced demand for less liquid securities and a larger spread between the two yields. The results are summarized in Table A.1.

Table A.1 about here

In all the equations the dependent variable is the spread between short-term and long-term government securities. South Africa adopted a much more market-determined approach to monetary policy beginning in the early 1980s. Since these policies changes would have affected the structure of interest rates, a dummy variable for the years after 1980 is included in the estimations (MON). The growth rate (GROW) is included to capture business cycle effects. The first differences of the index of political unrest and the spread variables are used in the regressions. Equation 1 includes the index of political unrest as a contemporaneous variable while equation 2 lags it one year. In both estimates the coefficient on the index of political unrest has the expected positive sign and is statistically significant at the 10 percent level. While these regression results are not meant to be conclusive, they do suggest that the index of political unrest could have an impact on investor expectations in financial markets.

The primary goal of this paper, however, is to estimate the impact of different variables on the rate of fixed capital accumulation (or, identically, the rate of net investment). Therefore, I now outline a theoretical framework for modelling investment in the face of political instability.

B. Theoretical model

Before estimating the effects of different determinants of investment, I constructed a simple theoretical model of investment behaviour. A number of standard assumptions on the behaviour of a representative firm are made in order to derive behavioural propositions that can be tested econometrically. In the model, investment

responds negatively to growing political unrest, positively to greater capacity utilization (the accelerator effect), and negatively to a higher user cost of capital.

The model begins with the investment decision of a single representative firm and, by extrapolation, the investment behaviour of a particular industrial sector. The firm makes an investment decision in period t-d that will be realized in t according to the following relationship:

B.1 $I_t = f(K^*_t - K_{t-d}) + D^e$, in which $0 \leq f \leq 1$.

I_t is the amount of planned fixed investment, K^*_t is the desired level of non-residential fixed capital stock in period t, and K_{t-d} is the actual level of capital stock in t-d. D^e is the expected level of depreciation of the current stock of capital over the time period d. The firm does not necessarily choose a level of net investment equal to the difference between desired and current capital stock. Adjustment costs, unforeseen delivery constraints, and a limited availability of finance could create a situation in which the firm invests less than the desired level; these effects are captured in the parameter, ö. In this model, actual investment is linear function of desired investment and will never be greater than the optimal amount of accumulation of fixed capital.

To capture the impact of political unrest and uncertainty surrounding the firm's future role as residual claimant I will introduce a parameter, γ (0 ≤ γ ≤ 1), which operates separately from the cost of capital. For simplicity's sake, γ will reflect the overall probability of a "bad state" in which profit flows are disrupted (profits = 0) due to political instability, and (1-γ) is the probability of a "good state". Furthermore, the costs of political disruption are assumed to be a linear function of the capital stock, in order to capture the idea that the total costs of political unrest are higher for larger firms than for smaller ones. The parameter γ can be interpreted in several ways. For example, it could reflect the firm's subjective estimation of the probability that the assets of the firm would be appropriated or that the institutions governing property rights would be transformed. In an alternative interpretation, γ could reflect the fraction of total productive activity that is disrupted by distributive conflicts and political unrest.

The desired level of investment is derived from the maximization of expected future profits. Therefore the firm will choose K^*_t to optimise, in t-d, the present value of a constant stream of expected future profits in time period t:

B.2 $\pi_{pv} = \delta \pi_t$

in which δ is the compound discount factor over time d and π_t can be expressed as follows:

B.3 $\pi_t = (1-\gamma)\{m^e_t(1-\tau)S(K_t, L_t, w^e_t) - r^e_t K_t\} - \gamma m K_t$

In the above expression:

μ^e_t is the expected level of firm-level capacity utilization;

τ is the average tax rate;

w^e_t is the expected average nominal wage level ;

ρ^e_t is the expected cost of capital, including opportunity costs; and

L_t is the labour input.

The function, $S(K_t, L_t, w^e_t)$, in B.3, is the full-capacity gross operating surplus of the firm – the total value of output minus total labour costs, or $Y(K_t, L_t) - w^e_t L_t$ in which $Y(\cdot)$ is a well-behaved production function. The price of output is normalized to one. Capacity utilization is assumed to be a function of the exogenously determined level of aggregate demand.

The first- and second-order conditions for maximization, which are assumed to hold, can be utilized to derive comparative statistics and to develop testable predictions about investment behaviour. These derivations are standard and obvious from the structure of the model. A summery of the main propositions to be tested is provided in Table B.1.

Table B.1 about here.

In estimating the relationships that the model predicts, the variables will be normalized on the capital stock. Therefore, the general form of investment function that will form the basis of the empirical estimations is:

B.4 $\quad \dfrac{I_t}{K_t} = \quad f(r_t, \boldsymbol{g}_t, \boldsymbol{m}_t, \boldsymbol{r}_t, z)$

in which r_t is the after-tax rate of profit and z is a vector of other explanatory variables.

C. Empirical estimations

C.1 Data sources and variables

Three primary sources of data are used for all empirical estimations: (1) the Reserve Bank of South Africa, (2) Statistics South Africa, and (3) the Survey of Race Relations. The Reserve Bank produces time series data that include national accounts variables, interest rates, fixed capital stock, and investment information. Statistics South Africa maintains data on labour market outcomes, including wages, employment, industrial disputes, and price indices. The Survey of Race Relations provides data on indicators of social and political unrest – for example, political detentions without trial and information on the prison population. From these sources, I compile a panel data set for the time period 1970-1993 (1970-92 for lagged variables) with cross-sections of the private, non-agricultural formal sectors of the economy. The time period covers the years of heightened distributive conflict and political resistance to apartheid policies. Earlier labour market data are not available for identical cross-sectional categories.

The dependent variable for all estimations of the investment function is the sectoral rate of change of the real, non-residential fixed capital stock, or the rate of net investment. Since the empirical work attempts to capture the effect of political unrest on the growth of the productive capacity of the economy, as opposed to a focus on aggregate demand, the rate of net investment, as opposed to gross investment, is the relevant variable of interest.

Profitability enters as a primary explanatory variable in the behaviour model developed in the prior section. Operating surplus is normalized by the size of the fixed capital stock in order to produce a proxy for the sectoral rate of profit. The computation of a profit rate involves the combination of labour market statistics from Statistics South Africa and capital stock variables from the Reserve Bank. In order to account for the effect of business taxation, the profit rate is adjusted downward by a factor of 1-ô, where ô is the average rate of taxation on business income less interest and rent payments. Therefore, the profitability variable used in the empirical estimations is an estimation of the after-tax rate of gross profits by sector.

The user cost of capital, $\tilde{n}$, used in the regression analysis was developed by Peter Fallon and Robert Lucas.[13] The variable covers the private sectors of the South African economy and incorporates measurements of the market interest rate, changes in the price of capital goods, and adjustments for tax rates. To adapt the cost of capital to the structure of the panel data set, the Fallon-Lucas index is deflated by implied producer prices for each industrial sector. The implied producer prices were derived from the Reserve Bank of South Africa's real and nominal series on value added. Following an argument parallel to that of Tobin's Q, it could be the case that investors respond to marginal changes in the ratio of the expected after-tax profit rate to the user cost of capital. To test this proposition empirically, the average ratio of the profit rate to the user cost was calculated as a proxy for this marginal change.

Capacity utilization estimates are difficult to generate for South Africa because of the lack of good time series data that could be used to construct reasonable estimates. While a measurement of capacity utilization based on survey methodology does exist for the manufacturing sector, the series only begins in the mid-1980s, making it difficult to use for a longer analysis that incorporates other industrial sectors. Since the capacity utilization term in the theoretical model is meant to capture accelerator effects, the lagged rate of change of real value added for each industrial sector will be used as a proxy for changes in capacity utilization in the econometric estimates. Furthermore, many investment functions for developing countries include a "crowding-in effect," i.e. the hypothesized positive impact of public infrastructure spending on private investment independent of the other determinants of investment. In the empirical estimates, this variable is captured by infrastructure spending by public authorities, normalized by the non-residential fixed capital stock.

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13   Data for this World Bank user cost of capital index was kindly supplied by Peter Fallon. Fallon and Lucas (1998) estimated labour demand relationships for South Africa, incorporating this measure of capital cost into their analysis.

A panel data set, incorporating the variables discussed in this section, was compiled for the seven major industrial sectors of the South African economy. The one significant sector excluded from the panel data is "social and community services" since the public service accounts for the bulk of the activity in this sector. A summary of the variables used is presented in Table C.1.

Table C.1 about here

C.2 Econometric results

Before moving on to the actual econometric estimations, a critical first step is to test for the stationarity of the variables to be used. Non-stationary variables would have to be differenced or cointegration techniques would have to be applied in the estimation procedure. To test for the stationarity of the each of the data series in Table C.1, I used an augmented Dickey-Fuller procedure. For each of variables, the following regression was estimated

$$\text{C.1} \qquad \Delta X_t = \boldsymbol{g} X_{t-1} + \boldsymbol{b} \Delta X_{t-1} + \boldsymbol{t} T + \boldsymbol{d} D_{1-7}$$

in which X is the variable in question, T is a deterministic time trend, and D_{1-7} represents dummy variables for each of the seven industrial sectors of the panel data set. For the variables that are invariant across the cross-sectional categories – for example, the index of political unrest – the dummy variables were omitted and only the time-series dimension was used. The results are presented in Table C.2 below. Two test statistics are reported, one for the null hypothesis of non-stationarity (that is, ã=0 versus ã<0) and the other for the hypothesis of no time trend (τ=0).

Table C.2 about here

Using the critical values of the Dickey-Fuller test presented in Charezma and Deadman (1997), the null hypothesis of non-stationarity can be rejected at the 5 percent level for the rate of accumulation, the after-tax profit rate, the real rate of growth in value added, and the user cost of capital. However, the test for the index of political unrest and the public infrastructure variables fail to reject the null hypothesis of non-stationarity. In the regressions that follow, the first-differences of these variables will be used. In addition, a time trend will be included in the estimations in order to account for the trend stationary variables.

Since the data possesses both cross-sectional and time series dimensions, the first set of estimations use the standard error-components technique that includes fixed effects to estimate the investment relationships.[14] In all cases, the dependent variable is the rate

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14   Both fixed and random effects estimators were used. Hausman tests did not reveal that random effects estimators would have been inappropriate. However, the coefficient estimates and their statistical significance were nearly identical for both the fixed effects and random effects estimators. Therefore, the results for only the fixed effects model are shown in Table 4.

of non-residential fixed capital accumulation. In addition, all these estimated equations have accounted for the presence of first-order autocorrelation. Note that all independent variables are lagged one period (and consequently range from 1970-92). Different lag structures do not change the outcomes significantly. Furthermore, in interviews conducted with large employers in South Africa, one year was given as a typical lag between the investment decision and the actual investment (Heintz 1998). Therefore, for the sake of simplicity, the lag structure will remain constant across the different econometric models.

In Table C.3, equation (1) presents results for the basic equation, in which real changes in value added, the ratio of after-tax profit rate to the cost of capital, and the index of political unrest are the exogenous variables. The coefficients on the accelerator term and the profit rate/cost of capital ratio have the expected positive sign and are statistically significant. More importantly for the focus of this paper, the index of political unrest has a coefficient that is both significant and negative.

While the ratio of the profit rate to the user cost of capital produces an interesting result, it would be helpful to know how these variables affect the rate of investment independently. Equation (2) introduces the after-tax profit rate and the user cost of capital as separate variables. The coefficients on the accelerator term and the profit rate retain their significant positive coefficients. However, the coefficient on the cost of capital variable, while negative, is not significant. Again, the index of political unrest remains both significant and negative. Including the public infrastructure investment variable, to capture possible "crowding-in effects," does not yield a significant coefficient, although the sign is positive (these results are available upon request).

Table C.3 about here

Equation (3) examines whether the exclusion of the user cost of capital affects any of the other estimated coefficients. All the estimated coefficients are approximately of the same size as those in equation (2) and they keep their statistical significance.

The regression equations so far have not explored whether the estimated coefficients managed to capture the dynamics of adjustment of the investment function. The last two equations of Table C.3 aims to investigate this issue by including lagged values of the endogenous variable on the right-hand side of the estimated model. The existence of auto-correlated error terms, however, introduces problems of endogeneity in models that include a lagged endogenous explanatory variable. To address this, an instrumental variable technique is incorporated into the fixed effects estimation, using lagged exogenous variables to construct an instrument. Corrections for first-order autocorrelation follow the method developed by Hatanaka (1974). Equation (4) demonstrates that the signs and significance of the coefficients remain robust to the inclusion of the lagged endogenous variable.

Long-run effects can be calculated by adjusting the coefficients by a factor of $1/(1-\beta_{DK})$ in which β_{DK} is the coefficient on the lagged endogenous variable.

Interestingly, comparing the results to equation (2) and transforming the coefficients in (4) to their long-run counter-parts reveals that the coefficient on the profit-rate variable in approximately of the same size. The coefficients on the accelerator term and the index of political unrest, however, are significantly larger. The user cost of capital variable has the expected negative sign, but remains insignificant. Equation (5) estimates the lagged endogenous variable model without the user cost of capital; the estimated coefficients are comparable to those in equation (4).

In the lower half of the table, the estimated coefficients on the fixed effects are shown. As can be seen by the t-values listed in the final row of the table, in first three equations – those without the lagged endogenous variable – the majority of the coefficients are statistically significant. Notice that throughout this time period, four sectors (mining; manufacturing; electricity, gas, and water; and transportation and communications) enjoyed higher rates of accumulation than the other sectors, other factors remaining equal. These results are consistent with the priorities of industrial policy during this period, which emphasized the development of capital-intensive industries. Not surprisingly, the inclusion of a lagged endogenous variable greatly reduces the significance of the fixed effects in equations (4) and (5).

James Heintz. TIPS Conference 18-20 September, Johannesburg. Current version: 28 August 2000.

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Figure 1

Rate of accumulation of non-residential fixed capital stock, South Africa, 1965-95
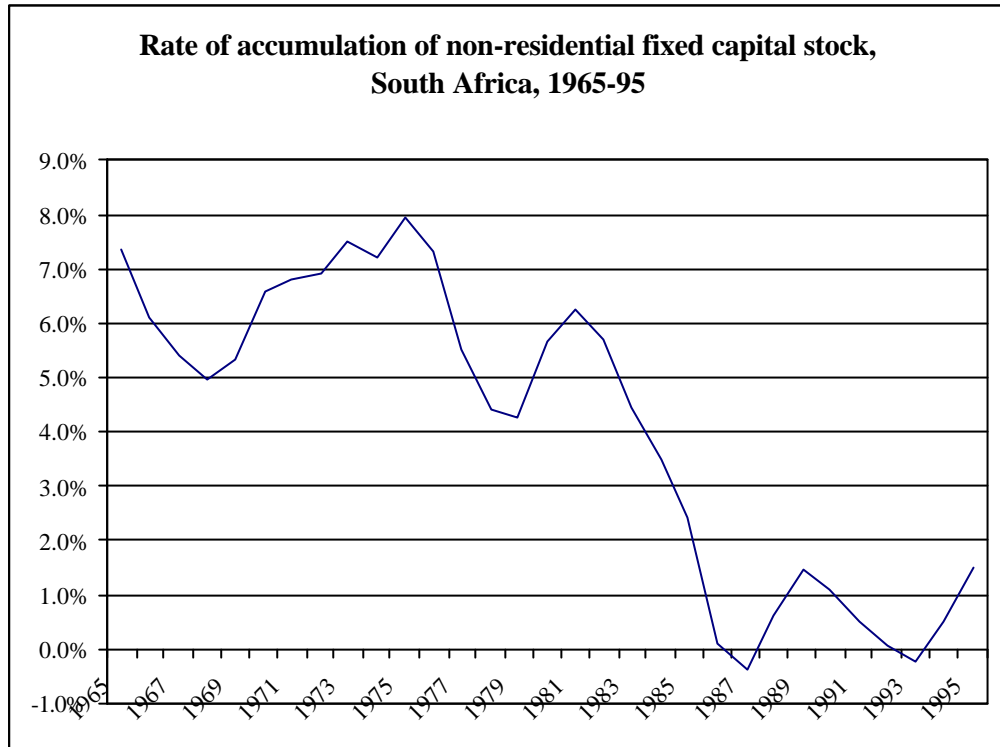
Table 1. Measures of the estimated impact of different factors
on the rate of fixed capital accumulation (that is, rate of investment).

Variables	Standardized coefficients	Impact on the rate of investment between business cycles (70-75, 85-92)
		Table 5, Equation (4)
Real growth in value added	0.0141	-1.81%
After-tax profit rate	0.0297	-2.29%
Political unrest/social conflict	-0.0246	-4.59%
User cost of capital	-0.0031	-0.14%

Figure A.1

Political instability index and components, standardized variables, 1970-92

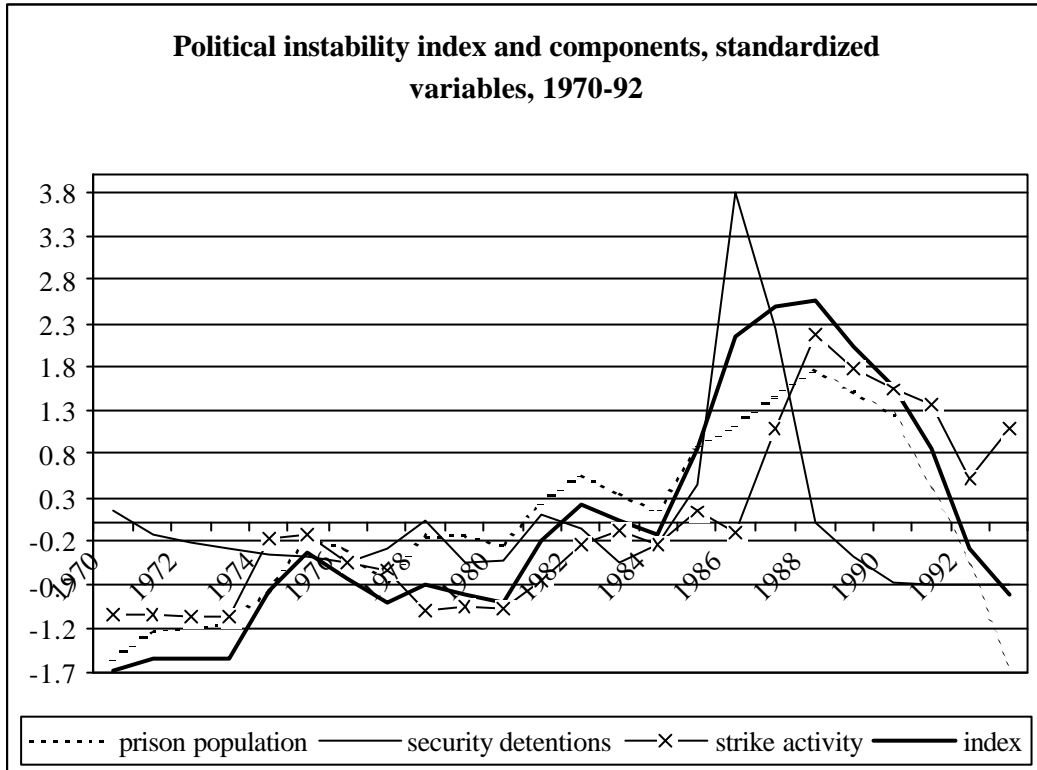prison population ⎯⎯ security detentions ⎯×⎯ strike activity ⎯⎯ index

Table A.1. Regressions results: impact of the index of political unrest on financial indicators .
t-statistics in parentheses (n=23).Variables expressed as first-differences.

	Dependent variable: spread between yields on long-term government bonds and three-month treasury bills	
Variables	**(1)**	**(2)**
POL_t	1.849 (1.804)	
POL_{t-1}		1.855 (1.802)
GROW	-58.03 (-2.368)	-54.38 (2.255)
MON_{81-92}	-2.543 (-1.175)	-3.248 (-1.403)
Time	0.092 (0.581)	0.165 (0.936)
Constant	1.335 (0.898)	0.537 (0.330)
R^2	0.111	0.124

26

Table B.1. Comparative statics of invesment model.

Relationship	Expected sign
$\dfrac{\partial I}{\partial \boldsymbol{g}}$	Negative
$\dfrac{\partial I}{\partial \boldsymbol{m}}$	Positive
$\dfrac{\partial I}{\partial \boldsymbol{r}}$	Negative

Table C.1. List of variables. t = year (1970-1992). i = sector (mining; manufacturing; construction; electricity, gas, & water; wholesale & retail trade; transportation & communications; and real estate & finance).

Variable	Description
$DVA_{t,i}$	Percent change in real value added by sector.
$PRT_{t,i}$	Gross after-tax profit rate by sector.
PBI_t	Investment by public authorities as a fraction of non-residential capital stock.
$CST_{t,I}$	Cost of capital by sector (real interest rate, rate of depreciation).
TIME	Linear time trend.
POL_t	Index of political unrest and distributive conflict.
$DK_{t,i}$	Rate of change of non-residential fixed capital stock.
$RAT_{t,i}$	Ratio of after-tax profit rate to user cost of capital.

Table C.2. Results of the augmented Dickey-Fuller test.

Variable	Test statistic $(H_o: t=0)$	Test statistic $(H_o: g=0)$	Process
$DK_{t,i}$	-5.661	-8.537	Trend stationary
$DVA_{t,i}$	-4.270	-10.384	Trend stationary
$PRT_{t,i}$	-1.482	-5.038	Stationary
$CST_{t,i}$	2.177	-10.384	Trend stationary
PBI_t	3.102	-3.371	Non-stationary
POL_t	1.068	-2.012	Non-stationary

TableC.3. Panel data regression results – fixed effects estimations.
Dependent variable: rate of fixed capital accumulation, 1971-1993,
t-statistics in parentheses (n=154)

	(1)	(2)	(3)	(4)	(5)
$DVA_{t-1,i}$	0.1283 (2.879)	0.1073 (2.586)	0.1081 (2.603)	0.1476 (3.603)	0.1497 (3.670)
$PRT_{t-1,i}$		0.1446 (4.717)	0.1494 (5.135)	0.0863 (3.326)	0.0915 (3.703)
$CST_{t-1,i}$		-0.0166 (-0.519)		-0.0212 (-0.698)	
$TIME_t$	-0.0051 (-7.124)	-0.0047 (-6.674)	-0.0048 (-6.894)	-0.0021 (-4.353)	0.0021 (-4.449)
$RAT_{t-1,i}$	0.0035 (2.513)				
$DK_{t-1,I}$				0.5062 (7.965)	0.5080 (8.021)
POL_{t-1}	-0.0090 (-2.214)	-0.0086 (-2.280)	-0.0083 (-2.228)	-0.0098 (-2.847)	-0.0094 (-2.774)
R^2	0.295	0.364	0.371	0.669	0.672
Fixed effects[*]					
Mine	0.1137 (7.175)	0.0692 (3.331)	0.0644 (3.431)	0.0260 (1.620)	0.0198 (1.473)
Man	0.1006 (6.459)	0.0665 (3.344)	0.0611 (3.538)	0.0240 (1.585)	0.0172 (1.465)
EGW	0.1006 (6.421)	0.0884 (5.247)	0.0849 (5.488)	0.0343 (2.750)	0.0296 (2.787)
Const	0.0958 (6.130)	0.0324 (1.294)	0.0254 (1.198)	0.0081 (0.410)	-0.0009 (-0.057)
Trade	0.0850 (5.430)	0.0332 (1.443)	0.0267 (1.368)	0.0067 (0.374)	-0.0015 (-0.108)
Trans/Com	0.0921 (5.935)	0.0809 (4.755)	0.0769 (5.027)	0.0330 (2.674)	0.0278 (2.788)
Fin	0.0966 (6.140)	0.0409 (1.716)	0.0341 (1.690)	0.0090 (0.473)	0.0004 (0.0266)

[*] *Sector abbreviations are as follows: mining (Mine); manufacturing (Man); electricity, gas, and water (EGW), construction (Const), wholesale and retail trade (Trade), transportation and communication (Trans/com), and finance (Fin).*